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FLAT LUMINAIRE

The invention relates to a luminaire having at least one luminous means in a flatly constructed luminaire housing composed of two rectangular frames. Such luminaires are known and described, for example, in DE 201 05 443 U1.

However, these luminaires have a relatively large overall height. It is also a disadvantage that the luminaires available on the market are designed only for precisely one type of mounting. It is therefore impossible to subsequently change the function of the same luminaire and use the latter for other types of mounting without changing its basic body in the process.

A further disadvantage is the complicated production of such luminaires.

It is therefore the object of the present invention to form a luminaire of the type mentioned at the beginning such that the luminaire can be combined in many ways both when first being mounted and for a later rededication, and can be mounted as a build-on or suspended luminaire, a vertically or horizontally arranged wall luminaire, a floor luminaire, standard luminaire or wire luminaire without altering the basic body of the luminaire in the process.

An object in this case is to be able to use various light distribution elements exchangeably such that the light both is guided directly onto a useful surface and is deflected indirectly and preferably in a colored fashion, and that further light sources such as high-voltage halogen radiators for example, can also be freely attached.

A further object in this case is that it is also possible to use standardized elements even for a

particularly flat luminaire design, in order to obtain an esthetically filigreed luminaire.

5 These objects are achieved by means of the features of the luminaire as claimed in claim 1. Special embodiments of the present invention are to be gathered from the subclaims.

10 Various exemplary embodiments of the invention will be explained in more detail below with the aid of drawings.

15 **Figure 1** shows in perspective an embodiment of a luminaire on a wire suspension as a suspended version.

Figures 2a, 2b show two embodiments of the luminaire in transverse and longitudinal section.

20 **Figure 3** shows further details of an embodiment in cross section.

Figures 4a, 4b show in perspective further details of the front wings of two embodiments of the luminaire.

25 **Figures 5-7** show in perspective various types of mounting for embodiments of the luminaire.

30 **Figure 1** shows diagrammatically a perspective illustration of the luminaire 1, obliquely from above. The luminaire has a flatly constructed and longitudinally extending luminaire housing 3 with two frames 4, 4' that are held at a constant and fixed spacing with the aid of spacer elements 8, 8a and angled spacer corner connectors 9.

35 The spacer elements and/or angled spacer corner connectors can for this purpose firstly be connected in one piece to the corresponding wings, or secondly also consist of separately fabricated pieces.

Located in the middle region of the frame in the longitudinal direction of the luminaire housing is a profile 10 that firstly holds the devices such as ballast 12, clamping and plug-in connectors and, furthermore, at the same time, serves as cable duct for laying and guiding cables. This profile is, for example, a U profile or a square profile, and is preferably arranged in a fashion detachably mounted on the transverse sides of the frame 4, for example, with the aid of matched retaining angles 10'. The profile has ends cut in a mitred fashion, for example.

In one exemplary embodiment, longitudinally running fluorescent lamps 2 are arranged left and right next to the profile 10. In the case of a ceiling connection, the luminaire 1 is suspended with two or, as illustrated, with four wires. In a further mounting version, the luminaire 1 can be fastened directly on the ceiling by means of screws with the aid of the mounting bores 21 on the profile 1.

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Figures 2a, 2b show two embodiments of the luminaire, both in cross section, that is to say looking onto the front wings, and in longitudinal section. The cross section shows that the two frames 4, 4' are held at a defined spacing from one another with the aid of spacer elements 8, 8a and angled spacer corner connectors 9, and therefore form a hollow chamber.

Light windows 4a in which the light radiates from inside to outside are formed in the longitudinal view (below) in both figures.

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Figure 2a shows an embodiment in the case of which wings, spacer elements and angled spacer corner connectors are assembled cost effectively from standard elements that must, however, each be procured and stored per se.

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For the embodiment shown in **Figure 2b** wings are

connected to one another in one piece, in a fashion drawn over a web, the web only being milled out after that in a suitable way to form a light window **4a** so that the spacer elements and angled spacer corner connectors are substantially of the same shape, as a result of which the stability of the luminaire **1** is substantially increased and storage and mounting are also facilitated.

- 10 **Figure 3** shows further details of such an embodiment, spacer elements at the ends of the lateral wings being provided at least there as counterpart for connecting the two frames, preferably with the aid of frame screws **5b**. The material of the frames can be freely selected.
- 15 Translucent or opaque plastic, any desired metal, or else a combination of the materials is advantageous as the material. The surface can be anodized, varnished, powder-coated, or chrome plated.
- 20 The cross-sectional profile of the frame is preferably that of a solid flat material. The surface should be designed such that it is possible to form reflective surfaces **7, 7'** that deflect light diffusely and couple it out all around effectively from the frame. If the width of one or more of the lateral wings and front
- 25 wings of one frame is greater than that of the corresponding other frame, the emerging light is visible in a particularly effective way.
- To deflect and couple out light in a colored fashion, it is possible for colored light distribution elements
- 30 **13** to be pushed into and fastened in the hollow chamber or a specified constant spacer region between the mutually facing and, possibly, elegantly curved surfaces **7, 7'** on all sides of the luminaire housing, said light distribution elements preferably being in
- 35 contact with the spacer elements **8** and angled spacer corner connectors **9**. If such light distribution elements **13** are also used instead of the spacer holders, they can take over the function of the latter

and are denoted in the drawings as **8a**. The light distribution elements **13** are optionally only present between the opposing lateral wings of the two frames, or they form a closed circumferential unit of the luminaire **1**. A further light distribution device **14** extends below the fluorescent lamps **2** and is inserted without tools at edge holders, for example, with the aid of two mounting profiles **26** in the lower frame **4**, with the aid of which the light is guided downward with direct distribution onto the useful surface. The light distribution device **14** can be produced from any desired material, such as plexiglass, and can have a geometric or prismatic scattering structure. For this purpose, the light distribution device can be provided on its underside with a suitable scattering structure, for example, with a grooved or prismatic structure, such that the light can propagate diffusely or with suppression of glare. On the other hand, it can also be a profile structure having a multiplicity of optically refracting surfaces by which the light is likewise diffusely scattered.

The cross section of the U profile **10** with a ballast **12** fastened therein is arranged approximately in the middle.

Figures 4a, 4b show two embodiments having front wings **6, 6'**, preassembled on the spacer corner connectors **9** of the two frames **4, 4'**, the mounts **11** preferably applied from the outside for two longitudinally running fluorescent lamps **2** and a bore for fastening a U profile **10**.

Figure 5 shows a wall luminaire as variant embodiment with a mounting example.

Two fastening bolts **19** are mounted on the wall with a flange and a screw. The fastening bolts **19** preferably

have a square cross section with the same outside dimensions as the inside dimension of the hollow chamber, and therefore fit one another exactly. The fastening bolts are fastened between the frames, 4, 4' of the luminaire 1 by means of a clamping screw 18 in the threaded bore 16'. Ideally, use is made in this case of the threaded bore that also serves, inter alia, for fastening the wire suspension.

Figure 6 shows (right-hand image) as a further mounting example, a wall luminaire that is fastened on the wall by means of two matching fastening angles 28, preferably with the aid of one screw each. The fastening angles have in cross section a U profile of special dimension such that the luminaire 1 can be suspended on a lateral wing or front wing. The luminous means of the luminaire are thus suspended running vertically or horizontally like a picture and independently of whether the lateral wings are longer than the front wings or not.

Figure 6 shows also (left-hand image) as a further mounting example, a standard luminaire with two fastening bolts 19 on a base plate 29. The fastening bolts preferably have a square cross section, their outside dimensions being equal in an accurately fitting fashion with the inner spacing between the frames 4, 4' (preferably approximately 10 mm).

As a further variant embodiment, Figure 7 shows a luminaire fastened on two clamping wires, two special clamping wires 22 as carriers of the luminaire 1 being clamped with the aid of clamping elements from wall to wall or from ceiling to floor. With this variant, supply is performed via a spiral cable 23 that is guided on a third clamping wire 22. The luminaire 1 can therefore be flexibly displaced freely in space in the direction of the clamping wire 22. Guides for the

clamping wire are present in the luminaire along the spacer corner connectors 9 below the upper frame 4 and in a cutout of the profile. The clamping wire 22' present in the middle above the U profile 10 is guided
5 on the wire holder 30 and secured. However, the spiral cable 23 can also simply be guided along a special clamping wire 22 serving as carrier of the luminaire 1.

The embodiments described with the aid of the figures are not to be understood as an exhaustive listing for the design of the invention claimed. Thus, a recumbent floor luminaire (not shown) is provided as a further mounting example, the luminaire being situated on four
10 spacer feet that are not screwed with the aid of the threaded bores 15. A further mounting example (not shown) is a suspended luminaire as in **Figure 1**, but suspended in the longitudinal direction on only two wires and mounted hanging vertically. If necessary, it is also possible to make use in addition of
15 conventional components (not shown) to secure the luminaire 1 against slippage of the clamping wire.

A further example of application is for the luminaire, which is extremely versatile despite its simple and cost-effective design, to be operated together with
25 auxiliary units and thus, for example, as a suspended luminaire with two high-voltage radiators 24 2 (4x) x 50 W/230 V. In this case, radiators in the form preferably of clamping reflector luminaires or the like are fastened on the upper flat frame 4 of the luminaire
30 1. They are connected electrically to the luminaire with the aid of a plug-in contact element 25, and can thus be operated jointly with the luminaire. It is particularly easy to make a fastening also on any projecting wings. For example, the width of the lateral
35 wings 5 and/or of the front wings 6 of one frame 4 may be seen to extend beyond the width of the corresponding wings 5', 6' of the other frame 4' and thereby brings to bear in a particularly effective way the colored

light distribution elements used.

A further example of application is a standard luminaire (not shown), the luminaire being held as usual between the frames with the aid of accurately fitting bolts and a support structure.

Two fluorescent lamps or high-voltage halogen lamps or metal-vapor lamps or LED lighting elements are preferably provided as luminous means 2 in the mounts 11 of the front wings 6, 6'.

The light distribution device 14 can be an opaque cover plate that is mounted as a reflector next to the profile 10. Another embodiment is, for example, a luminous array having longitudinally running reflectors and transversely running louvres, or a plastic plate having a number of hollow chambers running in the longitudinal direction or having prismatic structures in a plexiglass plate.

List of reference numerals

1	Luminaire
2	Luminous means
3	Luminaire housing
4, 4'	(Upper, lower) frame
4b	Frame screw
5, 5a, 5', 5a'	Lateral wings
5b	Light window lateral wing
6, 6a, 6', 6a'	Front wings
6b	Light window front wing
7, 7'	Mutually facing surfaces
8, 8a	Spacer elements
9, 9a	Angled spacer corner connectors
10	U profile
10'	Retaining angle
11	Mounts
12	Ballast
13	Light distribution elements
14	Light distribution device
15	Threaded bore
16	Wire suspension
16'	Threaded bore
17	Spacer feet
18	Clamping screw
19	Fastening bolts for wall or base plate mounting
21	Mounting bores
22	Clamping wire 1+2
22'	Clamping wire 3
23	High-voltage spiral cable 230 V
24	External light sources
25	Plug-in contact element
26	Mounting profile
28	Fastening angle wall mounting vertical
29	Base plate
30	Wire holder